

AMENDMENTS TO CLAIMS

Please amend claim 3 and cancel pending claims 12-48 as indicated below. A complete listing of all claims and their status in the application are as follows:

1. (Original) A thermally enhanced Plastic Ball Grid Array (PBGA) package comprising a heat sink for mounting over a surface of a substrate of the thermally enhanced Plastic Ball Grid Array (PBGA) package, said heat sink comprising: (a) a horizontal section being parallel with a substrate over which said heat spreader is being mounted, said horizontal section having a perimeter; (b) heat spreader stand-off sections extending from said perimeter of said horizontal section, a lower section of said heat spreader stand-off sections forming a physical interface between said heat spreader and said substrate over which said heat spreader is being mounted; (c) each of said heat spreader standoff sections comprising: (i) an upper section being connected with said horizontal section of said heat spreader under an angle (ii) a center section being connected with said upper section in a plane of said upper section, and (iii) said lower section being connected with said center section of said heat spreader standoff section; (d) each lower section of each of said heat spreader standoff sections comprising: (i) a first horizontal section being parallel with the surface of said substrate, said first horizontal section being connected with said lower section of said heat spreader stand-off section; (ii) a U-shaped extrusion connected with said first horizontal section, with a lower side of said U-shaped extrusion facing said substrate, with two retaining sides of said U-shaped extrusion interfacing with the surface of said substrate under an angle, with at least one opening having been created through said lower side of said U-shaped extrusion; and (iii) a second horizontal section connected to said U-shaped extrusion.

2. (Original) The thermally enhanced Plastic Ball Grid Array (PBGA) package of claim 1, additionally comprising: a substrate having a first and a second surface, at least one metal pad having been provided over the second surface of said substrate, additionally at least one semiconductor device having been mounted and interconnected over said second surface of said substrate; said heat spreader having been positioned over said second surface of said substrate; said at least one metal pad having been aligned with said at least one opening created through said lower side of said U-shaped extrusion; said at least one metal pad having been inserted into said at least one opening created through said lower side

of said U-shaped extrusion; and at least one supply of thermally conductive epoxy having been provided over the surface of said at least one metal pad, thereby at least overlying said lower side of said U-shaped extrusion with a layer of said thermally conductive epoxy.

3. (Original) The ~~method~~-structure of claim 2, said at least one metal pad comprising copper.

4. (Original) The thermally enhanced Plastic Ball Grid Array (PBGA) package of claim 1, additionally comprising: a substrate having a first and a second surface, at least one metal pad having been provided over the second surface of said substrate, said at least one metal pad having been provided with a stud bump over the surface thereof, additionally at least one semiconductor device having been mounted and interconnected over said second surface of said substrate; said heat spreader having been positioned over said second surface of said substrate; said stud bump provided over the surface of said at least one metal pad having been aligned with said at least one opening created through said lower side of said U-shaped extrusion; said at least one stud bump having been inserted into said at least one opening created through said lower side of said U-shaped extrusion; and at least one supply of thermally conductive epoxy or solder paste having been provided over the surface of said stud bump provided over said at least one metal pad, thereby overlying said stud bump and further at least overlying said lower side of said U-shaped extrusion with a layer of said thermally conductive epoxy or solder paste.

5. (Original) The structure of claim 4, said at least one metal pad comprising copper.

6. (Original) The structure of claim 4, said stud bump comprising gold.

7. (Original) The thermally enhanced Plastic Ball Grid Array (PBGA) package of claim 1, additionally comprising: a substrate having a first and a second surface, at least one metal pad having been provided over the second surface of said substrate, said at least one metal pad having been provided with a solder ball over the surface thereof, additionally at least one semiconductor device having been mounted and interconnected over said second surface of said substrate; said heat spreader positioned over said second surface of said substrate; said solder bump provided over said at least one metal pad having been aligned with said at least one opening created through said lower side of said U-shaped

extrusion; and said solder bump having been inserted into said at least one opening created through said lower side of said U-shaped extrusion.

8. (Original) The structure of claim 7, said metal pad comprising copper.

9. (Original) A thermally enhanced Plastic Ball Grid Array (PBGA) package comprising a heat sink for mounting over a surface of a substrate of the thermally enhanced Plastic Ball Grid Array (PBGA) package, said heat sink comprising: (a) a horizontal section being parallel with a substrate over which said heat spreader is being mounted, said horizontal section having extremities around a perimeter thereof; (b) heat spreader stand-off sections extending from said perimeter of said horizontal section, a second horizontal section of a lower section of said heat spreader stand-off sections forming a physical interface between said heat spreader and said substrate; (c) each of said heat spreader standoff sections comprising: (i) an upper section being connected to said horizontal section of said heat spreader under an angle; (ii) a first center section being connected with said upper section of said heat spreader standoff section in a plane of said upper section; (iii) a lower section being connected with said first center section of said heat spreader stand-off section, said lower section comprising: (1) a first horizontal section connected with said lower section of said heat spreader stand-off section, said first horizontal section being parallel with the surface of said (2) a second center section intersecting connected with said first horizontal section, said second center section intersecting the surface of said substrate under an angle; (3) said second horizontal section connected to said second center section; and (4) an essentially spherically shaped supportive metal interface between said first horizontal section of said lower section of said heat spreader stand-off section and the surface of said substrate as a physical extension of said first horizontal section.

10. (Original) The thermally enhanced Plastic Ball Grid Array (PBGA) package of claim 4, additionally comprising: a substrate having a first and a second surface, at least one metal pad having been provided over the second surface of said substrate, additionally at least one semiconductor device having been mounted and interconnected over said second surface of said substrate; said heat spreader positioned over said second surface of said substrate; said at least one metal pad having been aligned with said second horizontal section of said lower section thereby positioning said second horizontal section of said lower section over said at least one metal pad by a first measurable amount, exposing the surface of said at least one metal pad by a second measurable amount; and providing at least one supply

of thermally conductive epoxy over the surface of said second horizontal section of said lower section, thereby including the exposed surface of said at least one metal pad provided in a second surface of said substrate.

11. (Original) The structure of claim 10, said at least one metal pad comprising copper.

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